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NEW AND BETTER FERTILIZERS AT LOWER COST.

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U. S. Department of Agriculture

A radio talk by Dr. Henry G. Knight, chief, Bureau of Chemistry and Soils, delivered in the Department of Agriculture period of the National Farm and Home Hour, Friday, December 29, 1932, broadcast by a network of 48 associate NBC radio stations.

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SALISBURY:

After an absence of two weeks, Dr. Henry G. Knight, the chief of the Bureau of Chemistry and Soils, returns to the Farm and Home Hour microphone today to resume his series of talks on recent results of research work by chemists and soil scientists. Today's report will sum up the work done and in progress on fertilizers and fertilizer materials. This is an important branch of the research work in the Department of Agriculture. In normal times the farmers of the United States each year use 7 or 8 million tons of commercial fertilizer. At normal prices this fertilizer costs 250 million dollars. Most of the fertilizer is used in the South and East where conditions make it difficult to maintain soil fertility, but farmers in other sections are using more and more fertilizer. Therefore, I believe that every farmer listening today will be greatly interested in this talk by -----Dr. Henry G. Knight.

KNIGHT:

Thank you, Salisbury.

I have quite a complicated story to tell you and the Farm and Home Hour audience today in a brief time. So, I'm going to mention only very briefly the results up to date of fertilizer research and concentrate on setting before you the modern problems of getting and using better fertilizers at lower costs.

The modern problems involving fertilizers rise partly from the results of previous research work by our chemists. They played a large part, as most of you know, in developing the modern process for extracting nitrogen from the air. Before the scientists gave us this process, our entire fertilizer supply came either from mineral deposits or industrial waste products.

Now, using materials from mineral deposits or industrial wastes, it was impossible to make up a fertilizer mixture that contained more than 30 per cent of plant food. Most of the mixtures contained 15 per cent or less of plant food. But the new nitrogenous fertilizer materials from the air had much higher plant food content per unit of bulk than the older nitrogenous fertilizer materials. This meant that when the new nitrogenous materials were used in the ordinary mixtures, manufacturers had to add an excessive quantity of filler if they were to keep the grade or formula of the mixture the same as before.

Immediately the question came up, why add the filler? A number of years ago we had suggested that instead of adding filler, the best thing was to increase the total plant food content mixture. With these new nitrogen products, it was possible to increase the plant food content considerably above the former limit of
(over)

30 per cent simply by not adding filler. Manufacturers took to making fertilizer mixtures with high content of plant food and calling them concentrated fertilizers. But remember that these concentrate fertilizers differ from the older types of fertilizers only in containing less filler or inert material, and more plant food per ton. That is the only difference.

However, as concentrated fertilizers have come into use, new problems of applying them have come up. I am going now to tell you about our program of research on these problems. The basic problem is to increase the efficiency of the fertilizers. One way of increasing efficiency is making it easy to distribute the fertilizer uniformly. The second way of increasing efficiency is improving the quality of the fertilizer. A third way is insuring placement of the fertilizer at the correct distance from the seed.

Now here's our program of research on these three problems:

First, the problem of distributing fertilizer uniformly. Now the reason for lack of uniformity in distribution is either that the materials cake or become sticky, that they segregate in handling, or that their drillability is generally poor. We already have had good results in our research to improve the mechanical condition of a good many materials so as to prevent caking. Also, we're making progress on the problem of preparing mixed fertilizers, that will remain uniform in composition even under extreme conditions of handling or agitation in the distributing machine. We are giving attention to increasing the drillability of fertilizers generally both by improving the condition of the fertilizer materials, and the design of the machines used to distribute them.

Well, that's a very brief outline of our work on the problem of increasing the uniformity of distribution of fertilizers. Now, here is the work in progress on improving the quality of fertilizers. Fertilizers are of poor quality if they cause burning of the plants, produce an acid reaction of the soil, don't contain a proper balance in proportion of the fertilizing elements, or fail to put into the soil the amount of any plant food element required for the best growth of the crop.

Now any fertilizer --- or any other soluble mineral material for that matter--- will burn crops if it is too easily soluble so that after its application a concentration of soluble salts comes in contact with the roots of the plant.

Therefore we are experimenting with increasing the concentration of the fertilizer mixtures without increasing the proportion of soluble materials in the mixture. Let me say that contrary to popular opinion, an increase in the concentration of a fertilizer need not increase the danger of burning crop plants.

In attacking the problem of producing concentrated fertilizers that do not bring about acid reaction in the soil, we are experimenting with the inclusion of enough liming material in fertilizer mixtures to counteract the acid effects that some of the cheapest nitrogeous materials unfortunately have on soils. You can see that this problem is one of the most important at present, so we're giving it special attention.

We are also giving considerable attention to the problem of working out mixtures that include not only nitrogen, phosphoric acid, and potash, but also some of the minor fertilizing elements that are necessary for good crop growth on the different soils of different sections.

Now those are the major lines of research on the problem of improving quality of fertilizers. The third factor involved in our research is improvement in the method of placement of fertilizers. Crop and soil scientists in many parts of the country recently have been giving a great deal of attention to this subject. They have found that for maximum yields of cotton, corn and other crops the fertilizer should be placed in bands on both sides of the seed and at a distance of about two inches from the seed. They also have found that mixing most fertilizers with the seed at the time of planting delays germination and may cause serious injury to the growing seedlings. That brings up the problem of designing machinery that will correctly distribute the fertilizer and plant the seed all in one operation. The engineers and soil scientists are making progress on this problem.

So now I have given you an outline of our research on the problem of making fertilizers that can be uniformly distributed, of improving the quality of fertilizers, and of improving the methods of placing the fertilizers with respect to the seed.

In closing, I want to point out, especially to you people in the eastern and southern states where most fertilizer is used, that for greatest economy you should select fertilizers on the basis of their quality and plant food content rather than on their bulk or low cost per ton. The use of higher analysis fertilizers is becoming increasingly popular. This shows that farmers are realizing the economy in buying on the basis of quality and plant food content. The increase in the use of higher analysis fertilizers is most noticeable in the states where fertilizers haven't been used very much until recent years. Naturally, in these states the custom of using low analysis mixtures has not been firmly established. Thus, it happens that on the average, the fertilizers used in Maine, New York, Ohio, Indiana, and Wisconsin contain about 50 per cent more plant food than the fertilizers used in North Carolina, where farmers have been using relatively large quantities of fertilizers for a much longer time. But a gradual increase in the concentration of fertilizer in North Carolina and other southeastern states has taken place and we look for a further increase in the future. Our scientists believe that this is a sound, wise move.

That is my final word about the present fertilizer situation as it appears to our chemists and soil scientists. My next visit with you will be on Monday, December 19, when I shall talk with you about some of the newer facts regarding soil fertility revealed by our researches. Until then, goodbye.

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